Center Independent Research & Development: JPL IRAD

Combined Miniature Mass Spectrometer and Tunable Laser Spectrometer

Completed Technology Project (2015 - 2018)

Project Introduction

Prototyping a miniature mass spectrometer (MS) and a miniature tunable laser spectrometer (TLS) for future use on NASA's planetary missions including Discovery, New Frontiers, CubeSat and probe platforms.

Miniature gas cells, ion sources, and digital electronics will be developed for low volume, low power, yet maintaining high sensitivity. By miniaturizing the mass spectrometer and tunable laser spectrometer instruments to fit within typical 2U (20 cm x 10 cm x 10 cm) volumes, numerous new applications will be created for these important instruments that sense gas composition.

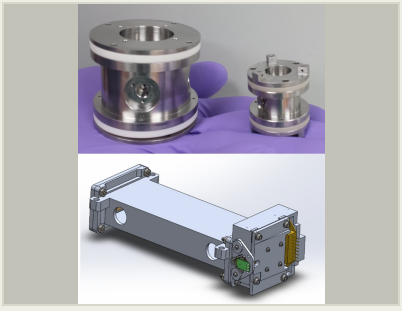
Anticipated Benefits

Through miniaturization of the mass spectrometer and tunable laser spectrometer instruments to fit within typical 2U (20 cm x 10 cm x 10 cm) volumes, numerous new NASA planetary mission opportunities will be created for these important instruments that sense gas composition.

Because mass spectrometers and tunable laser spectrometers are critical for NASA's planetary missions, it is expected that the instrument miniaturization will increase the opportunity for their inclusion on future missions, including CubeSat and descent probes that have limited payload size.

This technology project will demonstrate & validate reliable, capable, and cost effective miniature instrumentation that can be used for commercial space ventures.

Improving the state-of-the-art in miniaturized instrumentation will benefit other government agencies who need miniature gas sensing for a wide variety of applications such as commercial space, public safety, health.



Miniature prototype spectrometer

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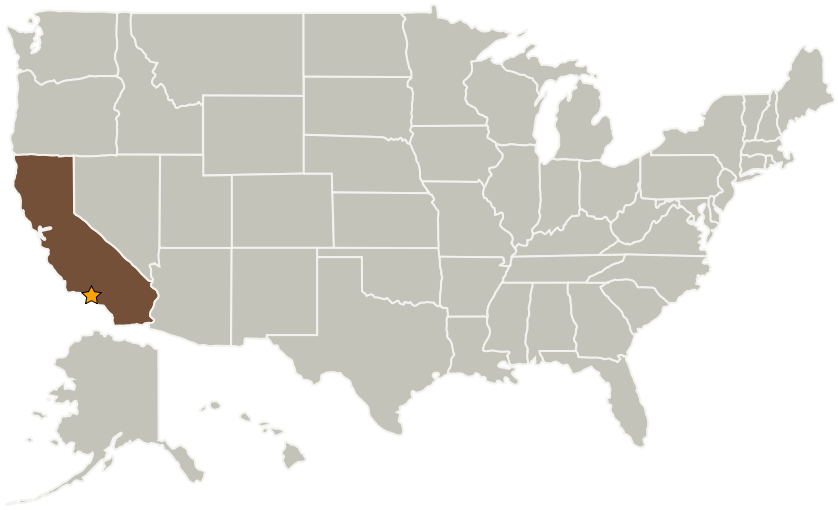
Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California

Primary U.S. Work Locations
California

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Center Independent Research & Development: JPL IRAD

Project Management

Program Manager:

Fred Y Hadaegh

Project Manager:

Fred Y Hadaegh

Principal Investigator:

Chris R Webster

Co-Investigator:

Stojan M Madzunkov

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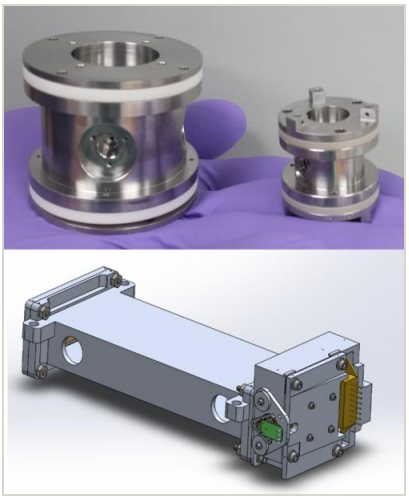
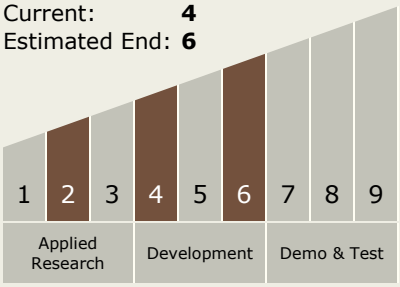
Images



Miniature prototype spectrometer
Miniature prototype spectrometer *(https://techport.nasa.gov/image/26027)*

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
  - TX08.1 Remote Sensing Instruments/Sensors
    - TX08.1.5 Lasers

Target Destinations

Earth, Others Inside the Solar System, Foundational Knowledge

Supported Mission Type

Push